5. REGULATORY CONSIDERATIONS

A. GENERAL

CBU's proposed new water treatment plant or expansion of the existing Monroe WTP will be designed and constructed during a period of rapid and unprecedented changes within the water industry. These changes are being driven by new regulations implemented in response to federal legislation; by the introduction of new water treatment processes, which have expanded many utilities' capabilities to meet specific treatment requirements; and by rising consumer expectations regarding the quality of their water supplies.

This chapter presents a detailed discussion of the current, impending and anticipated future drinking water regulations which may affect design and operation of the proposed new treatment facilities. At the end of this section is a summary of CBU's Monroe WTP compliance and compliance considerations for the proposed new treatment facilities.

One of the major challenges to be faced by water utilities in complying with these regulatory standards will involve "balancing" the particular requirements of different rules such that complying with one regulation does not result in violating a different regulation. As an example, water must be disinfected, but disinfecting chemicals might produce undesirable disinfection byproducts. Recent public health incidents in several large cities (most notably Milwaukee, Wisconsin) which were attributed to the presence of the protozoan parasite *Cryptosporidium* have served to heighten public awareness regarding the quality of drinking water supplies. Under impending and proposed future rules, removal requirements for *Cryptosporidium* have been promulgated, and additional requirements for inactivation of these pathogens are considered likely. Other recently enacted regulations reduce the allowable concentrations of trihalomethanes and haloacetic acids (by-products of disinfection using chlorine) in the treated water. Thus, utilities will be faced with reducing the concentrations of disinfection by-products, while at the same time increasing the removal and inactivation of *Cryptosporidium.*

5. REGULATORY CONSIDERATIONS

The first national regulatory standards for drinking water quality were established by the U.S. Public Health Service in 1914. The standards were revised in 1925, 1942, 1946, and 1962. In 1974, the Safe Drinking Water Act (SDWA) transferred responsibility for public water supplies to the U. S. Environmental Protection Agency (EPA). EPA later revised the SDWA to regulate a broad spectrum of contaminants. This section discusses current, pending, and anticipated future drinking water regulations.

B. CURRENT REGULATIONS

1. Safe Drinking Water Act of 1974

The Safe Drinking Water Act was promulgated in 1974. It mandated that National Primary Drinking Water Regulations be established for a number of chemical, physical, and biological contaminants. The regulations set maximum contaminant levels (MCLs) for individual contaminants and identified treatment technologies that could be used to remove the contaminants.

Following passage of this law, EPA promulgated National Interim Primary Drinking Water Regulations, which became effective in June 1977. These regulations established MCLs for ten inorganic chemicals, six organic chemicals, two radioactive categories, turbidity, and coliforms. In 1979, an MCL for trihalomethanes of 0.10 mg/L was added, and in April 1986, EPA promulgated an MCL for fluoride of 4.0 mg/L, and a Secondary MCL (SMCL) of 2.0 mg/L. While the fluoride SMCL is not a federally enforceable standard, individual State Regulatory Agencies are free to make the SMCL mandatory for public water supplies. However, EPA requires water systems which exceed the SMCL to notify their consumers.

5. REGULATORY CONSIDERATIONS

2. 1986 Amendments to the Safe Drinking Water Act

In June 1986, Congress passed comprehensive Amendments to the SDWA which have affected the operation of virtually every public water system in the United States. The Amendments empowered EPA to set enforceable standards for contaminants in drinking water based on the degree of removal that could be achieved using the "best available technology". EPA was also granted enforcement powers through the use of administrative orders. Thus, EPA is no longer limited to the legal system in its efforts to correct deficiencies in water supply systems.

The Amendments required EPA to initially develop regulations for 83 contaminants. Additional contaminants were to be added every three years, although the subsequent 1996 Amendments modified this requirement. Specific aspects of several existing regulations promulgated under the 1986 SDWA Amendments are discussed below.

a. Surface Water Treatment Rule. The Surface Water Treatment Rule (SWTR) pertains to utilities which use surface water sources or groundwater sources "under the direct influence of surface water". Major provisions of the SWTR are as follows:

- Filtered water turbidity is to be equal to or less than 0.5 NTU in 95 percent of the monthly samples collected. The maximum allowable interval between turbidity measurements is four hours.

- The disinfectant concentration in the water entering the distribution system must be at least 0.2 mg/L

- The disinfectant residual within the distribution system must be "detectable" in at least 95 percent of the monthly monitoring samples.

- Removal and/or inactivation of *Giardia* cysts must be at least 3.0 logs (99.9 percent), and removal and/or inactivation of enteric viruses must be at least 4.0 logs (99.99 percent).

b. Lead and Copper Rule. The Lead and Copper Rule, promulgated during May 1991, establishes "Action Levels" for lead and copper. Based on first-draw samples collected at taps within the distribution system, lead and copper concentrations must be less than 0.015 mg/L and 1.3 mg/L, respectively, in ninety percent of the samples. Selected sample sites must consist of single-family residences which contain copper pipes with lead solder installed after 1982, which contain lead pipes, or which are served by a lead service line. Following implementation of state-specified "optimal" treatment to minimize lead and copper concentrations at consumer taps, annual follow-up monitoring is required. If the results of follow-up monitoring indicated that the system is consistently in compliance with the lead and copper Action Levels, the state may elect to reduce the annual monitoring requirements. Should follow-up monitoring indicate noncompliance, the utility is required to initiate a public education program, collect additional water quality samples, and possibly begin a program of replacing lead service lines.

c. Phase II, Phase V SOC/IOC Regulations. The Phase II regulation for synthetic organic chemicals (SOCs) and inorganic chemicals (IOCs) lists MCLs and Maximum Contaminant Level Goals (MCLGs) for 30 SOCs and 9 IOCs. Establishment of limits for three Phase II SOCs (aldicarb, aldicarb sulfone, and aldicarb sulfoxide) has been delayed. (A final rule for aldicarb is not expected to be promulgated until August 2005.) The Phase V regulation lists MCLs and MCLGs for an additional 23 contaminants (18 SOCs and 5 IOCs). The MCL and MCLG for nickel included in the Phase V regulation were remanded by the US District Court during February 1995. Therefore, while utilities must continue to monitor for nickel in their treated water supplies, there currently is no EPA legal limit on the amount of nickel in drinking water supplies. Contaminants regulated

under the Phase II and Phase V regulations are primarily volatile organic compounds and pesticides/herbicides.

d. Total Coliform Rule. During June 1989, EPA promulgated revisions to the current regulation governing total coliform levels in water distribution systems. The revised rule expands current coliform monitoring requirements and specifies new MCLs. Compliance with the monthly MCL under the Coliform Rule is determined based on the presence or absence of coliform organisms. The Coliform Rule allows for up to 5 percent of the monthly water quality samples collected within the distribution system to test positive for coliforms. Fecal or *Escherichia* coliform levels are to be monitored for each sample where the presence of total coliforms is indicated. Public notification by electronic media (TV or radio) is required within 72 hours if a positive result indicates the presence of either fecal or *Escherichia* coliforms.

EPA subsequently modified the Total Coliform Rule to allow states to use a variance procedure for utilities encountering nonfecal biofilm problems in their distribution systems. Some coliform species, which are not classified as fecal, produce positive analytical results in total coliform and fecal coliform tests. Under the revised rule, states are allowed to disregard any coliform-positive analytical results that are speciated and not found to be of fecal origin.

3. 1996 Amendments to the Safe Drinking Water Act

The Safe Drinking Water Act was further amended in 1996, primarily to:

- Strengthen preventive approaches such as protecting source waters and providing operator certification.

- Provide consumers with more and better information about their water systems.

5. REGULATORY CONSIDERATIONS

- Implement regulatory improvements regarding contaminant selection, cost-benefits, and application of regulations to small systems.

- Establish a Drinking Water State Revolving Fund to assist communities in installing and upgrading drinking water treatment facilities.

Under the 1986 SDWA Amendments, utilities typically were allowed 18 months to comply with new regulations following final promulgation. The 1996 Amendments extend the compliance period following promulgation to three years; EPA or individual states may grant an additional 2 years if necessary to implement significant capital improvements. The 1996 Amendments establish specific schedules for promulgation of new regulations governing disinfection by-products (DBPs), microbial contaminants, arsenic, radon, and disinfection of groundwater supplies, and require EPA and the Centers for Disease Control to conduct a joint study of the potential health impacts of sulfate in drinking water supplies.

4. Stage 1 Disinfection By-Products Rule

Stage 1 of the Disinfection By-Products Rule (DBPR) was finalized during late November 1998, and became effective during January 2002 for systems serving 10,000 or more consumers. The primary objective of this rule is to protect human health by reducing the concentrations of disinfection by-products (DBPs) in drinking water. Major provisions of the Stage 1 DBPR are as follows:

- The MCL for total trihalomethanes has been reduced to 0.080 mg/L.

- New MCLs have been established for total haloacetic acids, bromate (a by-product of disinfection using ozone), and chlorite ion (a by-product of disinfection using chlorine dioxide).

5. REGULATORY CONSIDERATIONS

- Maximum Residual Disinfectant Levels (MRDLs) and MRDL Goals (MRDLGs) have been established for free chlorine, chloramine, and chlorine dioxide.

- A treatment technique has been established which requires that surface water systems (or groundwater systems under direct surface water influence) operate in either an enhanced coagulation or enhanced softening mode to achieve specified removals of total organic carbon (TOC).

As stated above, under the Stage 1 DBPR, the MCL for total trihalomethanes has been reduced to 0.080 mg/L. In addition, a new MCL of 0.060 mg/L has been established for total haloacetic acids, referred to as HAA5, as 5 of the 9 known haloacetic acid compounds are regulated under the Stage 1 rule. New MCLs for bromate and chlorite ion of 0.010 mg/L and 1.0 mg/L, respectively, also have been established. Compliance with these MCLs is assessed based on the "running annual average" of quarterly monitoring data.

Under the Stage 1 DBPR, the maximum allowable disinfectant residual in the water leaving the treatment facility, based on a running annual average of monthly monitoring data, is 4.0 mg/L for free chlorine and chloramines, and 0.8 mg/L for chlorine dioxide. Higher residuals are permissible on a short-term basis if necessary to address specific water quality problems, providing that running annual average concentrations do not exceed the MRDLs.

A primary goal of the DBPR is to reduce the levels of organic/humic compounds, collectively referred to as DBP precursors, which react with chlorine-based disinfectants to form DBPs. This is to be accomplished through operation of treatment facilities in an "enhanced coagulation" or "enhanced softening" mode, which will typically involve increases in coagulant dosages and/or adjustment of operating pH to optimize the removal of the precursor compounds. Precursor removal is to be quantified by measuring the removal of TOC across the

5. REGULATORY CONSIDERATIONS

treatment process. In general, for systems with average source water TOC concentrations exceeding 2.0 mg/L, enhanced coagulation/enhanced softening treatment will be required. Minimum TOC removal levels are summarized in Table 5-1. TOC removals must be determined monthly, and compliance is assessed quarterly based on a running annual average of monthly TOC removals.

Table 5-1
Step 1 TOC Removal Requirements
for Enhanced Coagulation/Enhanced Softening

Source Water TOC, mg/L	Percent TOC Removal Required at Indicated Source Water Alkalinity		
	0 – 60 mg/L	>60 – 120 mg/L	>120 mg/L[a]
>2.0 – 4.0	35%	25%	15%
>4.0 – 8.0	45%	35%	25%
>8.0	50%	40%	30%

a. Systems practicing softening must meet the TOC removals shown in this column.

The Stage 1 DBP rule also provides alternative compliance criteria that are independent of the criteria discussed above. Systems can be exempted from the enhanced coagulation/enhanced softening requirements if any of the following conditions are met:

- The system's source water TOC is less than 2.0 mg/L, calculated quarterly as a running annual average of monthly monitoring data.
- The system's treated water TOC is less than 2.0 mg/L, calculated quarterly as a running annual average of monthly monitoring data.

5. REGULATORY CONSIDERATIONS

- The system's source water TOC is less than 4.0 mg/L, the source water alkalinity is greater than 60 mg/L as $CaCO_3$, and the system is achieving TTHM concentrations less than 0.040 mg/L and HAA5 concentrations less than 0.030 mg/L.

- The system's running annual average TTHM concentration is less than 0.040 mg/L, and annual average HAA5 concentration is less than 0.030 mg/L, when only free chlorine is used for disinfection and maintenance of a residual in the distribution system. Systems using chloramines would not comply with these conditions.

- The system's source water specific UV absorbance (SUVA, defined as the ratio of the water's ultraviolet absorbance at 254 nm (UV_{254}) to its dissolved organic carbon (DOC) concentration) prior to any treatment is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average of monthly monitoring data.

- The system's finished water SUVA is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average of monthly monitoring data. This measurement must be made prior to the addition of a chemical oxidant, which will likely be problematic for most utilities.

Systems that elect to utilize one of these alternative criteria must still conduct monthly monitoring of source water TOC and alkalinity concentrations, and treated water TOC concentrations. Systems practicing lime softening may demonstrate compliance if they meet any of the six alternative compliance criteria listed above, or one of the following criteria:

- Softening that results in a reduction in the alkalinity of the treated water to less than 60 mg/L as $CaCO_3$, measured monthly and calculated quarterly as a running annual average.

5. REGULATORY CONSIDERATIONS

- Softening that results in removal of at least 10 mg/L of magnesium hardness as $CaCO_3$, measured monthly and calculated quarterly as a running annual average.

Following the first 12 months of TOC removal monitoring, if a system determines that it cannot achieve the TOC removals specified in Table 5-1 on a running annual average basis, and it does not meet any of the alternative compliance criteria listed above, it will be required to perform bench-scale or pilot-scale testing to set an alternative TOC removal requirement. This is referred to as Step 2 testing. Results of this testing must be reported to the state within three months of failing to achieve the TOC removal percentages presented in Table 5-1.

Under the Stage 1 DBPR, utilities serving more than 10,000 consumers must collect four DBP samples per quarter per treatment plant, and at least 25 percent of these samples must be collected at locations which reflect maximum system residence time. The Stage 1 rule also includes provisions for reduced monitoring if the following conditions are met:

- Source water TOC concentration prior to any treatment is less than or equal to 4.0 mg/L based on a running annual average of monthly TOC data.

- The system annual average TTHM and HAA5 concentrations are less than or equal to 0.040 mg/L and 0.030 mg/L, respectively.

Systems that meet these requirements will be required to collect only one TTHM/HAA5 sample per quarter per plant at a distribution system location considered to reflect maximum residence time. Systems on a reduced monitoring schedule may remain on that schedule as long as running annual TTHM and HAA5 concentrations remain at 0.060 mg/L and 0.045 mg/L,

respectively, and the annual average source water TOC concentration remains at 4.0 mg/L or less.

5. Interim Enhanced Surface Water Treatment Rule

The Interim Enhanced Surface Water Treatment Rule (IESWTR) was finalized during late November 1998, and became effective during January 2002 for systems serving 10,000 or more consumers. The rule applies to systems using surface water, or groundwater supplies under the influence of surface water. The primary objectives of this rule are to improve the control of microbial pathogens in drinking water, particularly *Cryptosporidium*, and to guard against significant increases in microbial risk that might occur when systems implement the Stage 1 DBPR. Primary requirements of the IESWTR are as follows:

- Systems with DBP levels exceeding or approaching the Stage 1 MCLs for trihalomethanes and haloacetic acids (0.080 mg/L and 0.060 mg/L, as discussed above) may consider changing their disinfection practices in order to comply with the new limits. However, in an effort to avoid increasing the risk from microbial contaminants while attempting to lower DBPs, EPA will require systems which have annual average DBP concentrations within 80% of the new MCLs (i.e., >0.064 mg/L for TTHMs or 0.048 mg/L for HAA5) for the most recent 12-month monitoring period to prepare a "disinfection profile" for state review prior to altering disinfection practices. The disinfection profile is a compilation of daily criteria that affect the overall efficacy of the disinfection process, collected over a minimum of one year. The average level of microbial inactivation for each month is developed from the disinfection profile, and the lowest monthly average inactivation becomes the disinfection benchmark. A minimum of one year, and a maximum of three years of daily disinfection performance data must be used to develop the disinfection profile. If the State does

not approve changes in disinfection, systems must develop alternate ways of reducing DBPs to meet the new MCLs.

- For those systems that do not have four quarters of distribution system HAA5 monitoring data available, HAA5 monitoring must be conducted for four consecutive quarters and completed by March 2000.

- Allowable finished water turbidity is reduced from the present 0.5 NTU allowed under the SWTR to 0.3 NTU. This standard applies to the combined filtered water, and a minimum of 95 percent of the monthly turbidity measurements must meet the revised turbidity criteria. The turbidity of the combined filter effluent cannot exceed 1 NTU at any time. The current SWTR allows for a maximum filter effluent turbidity of 5 NTU.

- Continuous turbidity monitoring is required for each filter, and specific performance criteria will apply to each filter. Systems must record the results of individual filter turbidity monitoring at 15-minute intervals, and must maintain records of individual filter performance for a minimum of three years.

- Systems treating surface water or groundwater under direct surface water influence and serving more than 10,000 consumers must achieve at least a 2-log (99%) removal of *Cryptosporidium*. The regulation states that systems that comply with the revised turbidity requirement of 0.3 NTU are assumed to be achieving compliance with the 2-log *Cryptosporidium* removal requirement.

- States will be required to conduct sanitary surveys for all public water systems, regardless of size, no less frequently than every 3 years.

5. REGULATORY CONSIDERATIONS

Under the IESWTR, systems are required to provide "an exceptions report to the State on a monthly basis". Exceptions to be reported consist of the following:

- Any individual filter with a turbidity level greater than 1.0 NTU based on 2 consecutive measurements 15 minutes apart.

- Any individual filter with a turbidity level greater than 0.5 NTU at the end of the first 4 hours of operation, based on 2 consecutive measurements 15 minutes apart.

A "filter profile" is to be produced if "no obvious reason for the abnormal filter performance can be identified". Other requirements are as follows:

- If an individual filter has turbidity levels greater than 1.0 NTU, based on 2 consecutive measurements 15 minutes apart at any time in each of three consecutive months, the water system is required to conduct a self-assessment of the filter utilizing "relevant portions" of guidance issued by EPA under its Comprehensive Performance Evaluation (CPE) program.

- If an individual filter has turbidity levels greater than 2.0 NTU based on 2 consecutive measurements 15 minutes apart at any time in each of two consecutive months, the water system must arrange for a CPE to be conducted by the State or a third party approved by the State. The State will ensure that the recommendations resulting from the CPE are implemented.

Methods for conducting CPEs and individual filter performance assessments are detailed in the April 1999 EPA publication "Guidance Manual for Compliance with the Interim Enhanced Surface Water Treatment Rule: Turbidity Provisions".

5. REGULATORY CONSIDERATIONS

6. Consumer Confidence Reports Rule

As directed by the 1996 SDWA Amendments, all Public Water Systems serving more than 500 consumers will need to prepare annual reports (beginning no later than October 1999) to advise their users of the quality of the distributed water. The reports must contain a specific list of material such as information on the source water, an explanation of terms such as MCLs and MCLGs, data on levels of currently-regulated contaminants in the treated water, and information regarding potential health effects of the contaminants. A copy of CBU's 2002 Consumer Confidence Report is included in Appendix A.

7. Secondary MCLs

Secondary Maximum Contaminant Levels (SMCLs) for 13 contaminants were initially set in 1979. Contaminants included in these secondary regulations do not have a direct impact on consumer health; however, if present in excessive amounts, they may affect the palatability and aesthetic quality of the water. SMCLs are not federally enforceable, although state regulatory agencies may elect to promulgate enforceable MCLs for any of the contaminants included in the secondary regulations. The SMCL for fluoride was revised in 1986, and new SMCLs for aluminum and silver were added in 1991.

8. Arsenic

EPA proposed revisions to the current drinking water standard for arsenic during May 2000, and promulgated a new MCL of 0.01 mg/L during January 2001. The new MCL becomes effective 5 years after promulgation, i.e., during January 2006. Some aspects of the rule, such as monitoring and reporting requirements, will be effective prior to January 2006, but the original MCL of 0.05 mg/L will remain effective until January 2006. Utilities must begin providing health information and data on treated water arsenic concentrations in their annual

5. REGULATORY CONSIDERATIONS

Consumer Confidence Report by July 2002 if the water supply contains more than 0.005 mg/L of arsenic.

Considerable controversy currently surrounds the regulation of arsenic in drinking water supplies, and during March 2001, EPA announced its intention to withdraw this regulation as currently promulgated to allow further review. During July 2001, EPA requested additional comment on whether to set the new arsenic MCL at 0.003, 0.005, 0.010, or 0.020 mg/L. However, on October 31, 2001, the EPA Administrator announced that the Agency would retain the 0.01 mg/L MCL, and that the original compliance date of January 2006 would not be altered.

9. Radionuclides

Radionuclides normally present problems for systems that treat groundwater from deep wells or that are located downstream from an industrial source of radiation. A proposed rule for several radionuclides (radon, radium, alpha, beta, and photon emitters, and radium) was released in 1991, but not finalized until December 2000. This rule established a new MCL for uranium of 30 µg/L; however, EPA elected to retain the MCLs for radium and alpha, beta, and photon emitters established under the original SDWA in 1976 with no modifications. The new regulation does include separate monitoring requirements for radium-228 under the combined MCL for radium-226 and radium-228.

10. Filter Backwash Recycling Rule

The Filter Backwash Recycling Rule (FBRR) was proposed concurrently with the LT1ESWTR during April 2000, but promulgated as a separate regulation during June 2001. Provisions of the FBRR addressing in-plant recycling of waste streams apply to all systems. In addition to filter backwash flows, recycle streams covered under this regulation consist of sludge thickener supernatant, and flows associated with sludge dewatering processes. Plants practicing recycle of these streams within the treatment plant must return them to a location

such that all unit processes of a system's conventional or direct filtration process are employed in the treatment of the recycle flow. This location will typically be the plant headworks prior to the addition of coagulant. All systems that recycle these flows must submit a plant process schematic to the state regulatory agency for review by December 2003 showing the current recycle return location and the proposed return location that will be used to establish compliance. Data on typical recycle flow rates, maximum recycle flow rates, and the plant design capacity and state-approved maximum operating capacity must also be submitted to the state regulatory agency by December 2003. Systems must also collect and maintain additional information on filter operating data, recycle flow treatment provided, physical dimensions of recycle flow equalization and/or treatment units, and recycle flow rate and frequency data for review and evaluation by the state regulatory agency beginning June 2004.

Systems must comply with the recycle return provisions of the FBRR no later than June 2004. If the system requires capital improvements to modify the location of the recycle return, these improvements must be in place and operational by June 2006.

The regulation does not address recycle of filter-to-waste flows. Process solids recycle flows from lime softening and contact clarification units are also not covered by the FBRR. However, softening systems may not return spent filter backwash, thickener supernatant, or liquids from solids dewatering processes to a location that does not incorporate all unit treatment processes.

11. Summary of Current MCLs and SMCLs

Current drinking water standards, MCLs and Maximum Contaminant Level Goals (MCLGs), are summarized in Table 5-2. Table 5-2 includes only currently effective, or "enforceable" MCLs.

5. REGULATORY CONSIDERATIONS

Table 5-2
Current Drinking Water Standards (as of November 2002)

Contaminant	Regulation	MCL, mg/L	MCLG, mg/L
Organic substances			
Acrylamide	Phase II	Treatment Technique	Zero
Alachlor	Phase II	0.002	Zero
Atrazine	Phase II	0.003	0.003
Benzene	Phase I	0.005	Zero
Benzo(a)pyrene	Phase V	0.0002	Zero
Carbofuran	Phase II	0.04	0.04
Carbon tetrachloride	Phase I	0.005	Zero
Chlordane	Phase II	0.002	Zero
2,4-D	Phase II	0.07	0.07
Dalapon	Phase V	0.2	0.2
Di(2-ethylhexyl) adipate	Phase V	0.4	0.4
Di(2-ethylhexyl) phthalate	Phase V	0.006	Zero
Dibromochloropropane (DBCP)	Phase II	0.0002	Zero
p-dichlorobenzene	Phase I	0.075	0.075
o-dichlorobenzene	Phase II	0.6	0.6
1,2-dichloroethane	Phase I	0.005	Zero
1,1-dichloroethylene	Phase I	0.007	0.007
cis-1,2-dichloroethylene	Phase II	0.07	0.07
Trans-1,2-dichloroethylene	Phase II	0.1	0.1
Dichloromethane (methylene chloride)	Phase V	0.005	Zero
1,2-dichloropropane	Phase II	0.005	Zero
Dinoseb	Phase V	0.007	0.007
Diquat	Phase V	0.02	0.02
Endothall	Phase V	0.1	0.1
Endrin	Phase V	0.002	0.002
Epichlorohydrin	Phase II	Treatment Technique	Zero
Ethylbenzene	Phase II	0.7	0.7
Ethylene dibromide	Phase II	0.00005	Zero
Glyphosate	Phase V	0.7	0.7
Haloacetic Acids (total)	Stage 1 DBPR	0.060	-
Heptachlor	Phase II	0.0004	Zero
Heptachlor epoxide	Phase II	0.0002	Zero
Hexachlorobenzene	Phase V	0.001	Zero
Hexachlorocyclopentadiene	Phase V	0.05	0.05
Lindane	Phase II	0.0002	0.0002
Methoxychlor	Phase II	0.04	0.04
Monochlorobenzene	Phase II	0.1	0.1
Oxamyl (vydate)	Phase V	0.2	0.2

5. REGULATORY CONSIDERATIONS

Table 5-2
Current Drinking Water Standards (as of November 2002)

Contaminant	Regulation	MCL, mg/L	MCLG, mg/L
Pentachlorophenol	Phase II	0.001	Zero
Picloram	Phase V	0.5	0.5
Polychlorinated byphenols	Phase II	0.0005	Zero
Simazine	Phase V	0.004	0.004
Styrene	Phase II	0.1	0.1
2,3,7,8-TCDD (dioxin)	Phase V	3×10^{-8}	Zero
Tetrachloroethylene	Phase II	0.005	Zero
Toluene	Phase II	1	1
Toxaphene	Phase II	0.003	Zero
2,4,5-TP (silvex)	Phase II	0.05	0.05
1,2,4-trichlorobenzene	Phase V	0.07	0.07
1,1,1-trichloroethane	Phase I	0.2	0.20
1,1,2-trichloroethane	Phase V	0.005	0.003
Trichloroethylene	Phase I	0.005	Zero
Trihalomethanes (total)	Stage 1 DBPR	0.080	NA
Vinyl chloride	Phase I	0.002	Zero
Xylenes (total)	Phase II	10	10
Inorganic Substances			
Antimony	Phase V	0.006	0.006
Arsenic	Interim	0.05	NA
Asbestos (fibers/L > 10 um)	Phase II	7 million	7 million
Barium	Phase II	2	2
Beryllium	Phase V	0.004	0.004
Bromate	Stage 1 DBPR	0.010	Zero
Cadmium	Phase II	0.005	0.005
Chlorite	Stage 1 DBPR	1.0	0.8
Chromium (total)	Phase II	0.1	0.1
Copper	LCR	Treatment Technique	1.3
Cyanide	Phase V	0.2	0.2
Fluoride	-	4	4
Lead	LCR	Treatment Technique	Zero
Mercury	Phase II	0.002	0.002
Nitrate (as N)	Phase II	10	10
Nitrite (as N)	Phase II	1	1
Nitrate + Nitrite (both as N)	Phase II	10	10
Selenium	Phase II	0.05	0.05
Thallium	Phase V	0.002	0.0005

5. REGULATORY CONSIDERATIONS

Table 5-2
Current Drinking Water Standards (as of November 2002)

Contaminant	Regulation	MCL, mg/L	MCLG, mg/L
Radionuclides			
Beta-particle and photon emitters	Interim	4 mrem	Zero
Alpha emitters	Interim	15 pCi/L	Zero
Radium 226 + 228	Interim	5 pCi/L	Zero
Microorganisms			
Cryptosporidium	IESWTR	2-log Removal	Zero
Escherichia coli	TCR	Treatment Technique	Zero
Fecal coliforms	TCR	Treatment Technique	Zero
Giardia lamblia	SWTR	Treatment Technique	Zero
Heterotrophic bacteria	SWTR	Treatment Technique	NA
Legionella	SWTR	Treatment Technique	Zero
Total coliforms	TCR	(a)	Zero
Turbidity	SWTR	0.3[b]	NA
Viruses	SWTR	Treatment Technique	Zero

a. No more than 5 percent of monthly samples may be positive for presence of coliforms.
b. Performance standard; no more than 5 percent of monthly samples may exceed 0.3 NTU.
DBPR = Disinfection By-Products Rule
IESWTR = Interim Enhanced Surface Water Treatment Rule
LCR = Lead and Copper Rule
SWTR = Surface Water Treatment Rule
TCR = Total Coliform Rule

5. REGULATORY CONSIDERATIONS

Current Secondary Maximum Contaminant Levels are summarized in Table 5-3.

Table 5-3
Current Secondary Drinking Water Standards

Contaminant	SMCL
Aluminum	0.05 - 0.2 mg/L
Chloride	250 mg/L
Color	15 Color Units
Copper	1.0 mg/L
Corrosivity	Non-corrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 Threshold Odor Units
PH	6.5 – 8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

C. PENDING REGULATIONS

1. Stage 2 Disinfection By-Products Rule

As part of the 1996 amendments to the SDWA, Congress established deadlines for promulgation of new regulations governing both disinfection by-products and microbial contaminants. These deadlines include a requirement that EPA promulgate a Stage 2 regulation for disinfection by-products, and a Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR, as discussed in the following section of this document) by May 2002. These two rules are closely related, and are referred to collectively as the Stage 2 M-DBP. The Advisory

5. REGULATORY CONSIDERATIONS

Committee convened by EPA during early 1999 to develop recommendations for implementation of these regulations reached consensus during September 2000 on an agreement to be presented to EPA. The "Stage 2 M-DBP Agreement in Principle" summarizes the committee's recommendations for implementation of these rules, and will be the basis for EPA's development of the Stage 2 DBPR and the LT2ESWTR. A draft version of the proposed Stage 2 DBPR was made available for comment during November 2001. These two regulations are currently scheduled to be proposed during June 2003 and promulgated during October 2004. The Stage 2 DBPR requirements will apply to all community water systems and non-transient non-community water systems that add a disinfectant other than UV or deliver water that has been disinfected. Key points pertaining to the Stage 2 DBPR are summarized below.

Review of disinfection by-products occurrence data obtained under the Information Collection Rule suggests that many systems have been achieving compliance with the original TTHM regulation by selecting quarterly monitoring dates to obtain samples that may not be representative of the actual variations in DBP formation that occur throughout the year. This was often accomplished by avoiding monitoring when water temperatures are warmest and when DBP formation rates are highest. The Advisory Committee has therefore developed recommendations regarding appropriate monitoring intervals to correct this problem under the Stage 2 rule. The Stage 2 MCLs would remain at the levels established under the Stage 1 rule, i.e., TTHMs=0.080 mg/L and HAA5=0.060 mg/L. However, monitoring procedures and schedules would be modified to ensure that the data obtained more closely represent actual long-term exposure conditions. Initial compliance efforts will focus on identifying points within the system where DBP concentrations are typically highest, and would involve the following:

- For systems serving 10,000 or more consumers; one year of monitoring of TTHM and HAA5 concentrations at 60-day intervals (±3 days) at eight additional locations within the distribution system. Systems served by more than one treatment facility would be required

to monitor at eight locations per treatment plant. For systems that maintain a free chlorine residual within the distribution system, the eight monitoring sites per plant would consist of (1) one sample near the distribution system entry point, (2) two sites considered to reflect "average" system DBP concentrations, and (3) five sites considered to reflect "maximum" system DBP concentrations. For systems that maintain a chloramine residual within the distribution system, the eight monitoring sites per plant would consist of (1) two samples near the distribution system entry point, (2) two sites considered to reflect "average" system DBP concentrations, and (3) four sites considered to reflect "maximum" system DBP concentrations. This monitoring, referred to in the draft proposed regulation as the Initial Distribution System Evaluation (IDSE) monitoring study, would be conducted in addition to the quarterly compliance monitoring conducted under the current TTHM regulation and the impending Stage 1 DBPR. A report summarizing the IDSE monitoring results must be submitted to the State/Primacy Agency within two years of promulgation of the Stage 2 DBPR. The draft proposed rule includes provisions for exemption from IDSE monitoring requirements, based on low historical system DBP concentrations.

- Following completion of the IDSE, systems will recommend new or revised monitoring sites to their State/Primacy Agency based on their ISDE study. Monitoring site locations (four per system if served by a single treatment plant; four per system per plant if served by multiple treatment plants) are to be selected as follows:

  - One location representative of average conditions from among current Stage 1 DBPR monitoring locations.

  - One location representative of highest HAA5 concentrations identified under the IDSE.

5. REGULATORY CONSIDERATIONS

- Two locations representative of highest TTHM concentrations identified under the IDSE.

Quarterly monitoring of DBP concentrations at four locations per plant within the distribution system would continue to be conducted for compliance monitoring purposes. At least one quarterly monitoring period would be required to reflect "peak historical" DBP formation level periods, and systems will be required to monitor on a regular schedule of approximately every 90 days. MCL compliance will be determined based on a "Locational Running Annual Average" (LRAA) basis, i.e., a running annual average must be calculated at each monitoring location. Systems will be required to comply with the Stage 2 MCLs in two phases:

- 3 years after promulgation, all systems must comply with locational running annual average MCLs of 0.120 mg/L for TTHMs and 0.100 mg/L for HAA5 at current Stage 1 DBPR monitoring sites, while continuing to comply with the Stage 1 MCLs of 0.080 mg/L for TTHMs and 0.060 mg/L for HAA5. These are currently being referred to as "Stage 2A" requirements.

- 6 years after promulgation, with an additional two-year extension available if capital improvements are required, large and medium-sized systems must comply with locational running annual average MCLs of 0.080 mg/L for TTHMs and 0.060 mg/L for HAA5 at the approved sampling locations identified under the IDSE. These are currently being referred to as "Stage 2B" requirements.

Should an MCL be exceeded at one or more system monitoring points based on annual running average DBP concentrations, the system would be considered to be in violation of the Stage 2 regulation, regardless of results for the remaining monitoring sites. This represents a major change from current TTHM and

5. REGULATORY CONSIDERATIONS

Stage 1 DBP regulations, as the "system averaging" concept would be eliminated under the Stage 2 regulation.

During Stage 2A, systems that maintain system running annual average TTHM and HAA5 concentrations of less than or equal to 0.040 mg/L and 0.030 mg/L, respectively, may reduce quarterly monitoring frequency for TTHMs and HAA5 to one sample per treatment plant at a site representative of maximum system residence time. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as running annual average TTHM and HAA5 concentrations for all samples collected are no more than 0.060 mg/L and 0.045 mg/L, respectively. During Stage 2B, systems that have completed one year of routine monitoring at IDSE sites, and that exhibit TTHM and HAA5 locational running annual average concentrations of no more than 0.040 mg/L and 0.030 mg/L, respectively, and annual average source water TOC levels of 4.0 mg/L or less will be allowed to reduce the number of DBP samples collected to two per quarter per treatment plant. For each quarterly sample pair, one sample would need to be collected at a location reflecting maximum TTHM levels, while the remaining sample would need to be collected at a location reflecting maximum HAA5 levels.

The Advisory Committee also recommended that systems review peaks in TTHM and HAA5 concentrations that may occur in their distribution systems as part of the sanitary survey process, and EPA has adopted this recommendation in the draft proposed Stage 2 DBPR. EPA defines a peak as any individual sample with a TTHM concentration of 0.100 mg/L or greater, and/or with an HAA5 concentration of 0.075 mg/L or greater (these values exceed the Stage 2 MCLs by 25 percent). Utilities experiencing these peaks would be required to work with their state primacy agencies to reduce the severity of these excursions; EPA will be preparing guidance for systems and State primacy agencies on how to conduct peak excursion evaluations and how to reduce peaks.

5. REGULATORY CONSIDERATIONS

The following is proposed by EPA in the draft Stage 2 DBPR as Best Available Technology (BAT) for compliance with the LRAA MCLs when free chlorine is used as the primary and secondary (system residual) disinfectant:

- GAC adsorbers with at least 10 minutes of empty bed contact time and an annual average carbon reactivation/replacement frequency no greater than 120 days.

- GAC adsorbers with at least 20 minutes of empty bed contact time and an annual average carbon reactivation/replacement frequency no greater than 240 days.

- Nanofiltration using a membrane with a molecular weight cutoff of 1000 Dalton or less or demonstrated to reject at least 80% of the influent TOC concentration under typical operating conditions.

Considerable pressure to reduce the Stage 1 MCL for bromate to 0.005 mg/L or less currently exists, as ongoing research suggests that this contaminant may be more carcinogenic than originally believed. This change would primarily impact utilities practicing ozonation for primary disinfection and/or utilities that employ high dosages of sodium hypochlorite. However, the draft proposed Stage 2 DBPR recommends that the MCL for bromate remain at the current value of 0.010 mg/L. As recommended by the Advisory Committee, EPA would review the bromate MCL as part of the 6-year regulatory review process required under the Safe Drinking Water Act to determine whether the MCL should remain at 0.010 mg/L or be reduced to 0.005 mg/L or lower.

2. Long-Term Enhanced Surface Water Treatment Rule

A long-term Enhanced Surface Water Treatment Rule which extends the IESWTR requirements to systems serving less than 10,000 consumers was promulgated during January 2002 and will become effective during January

5. REGULATORY CONSIDERATIONS

2005. This regulation is referred to as the Stage 1 Long-Term Enhanced Surface Water Treatment Rule, or LT1ESWTR.

A long-term Stage 2 ESWTR, currently being referred to as the LT2ESWTR, is expected to be promulgated during October 2004. This rule will apply to all public water systems that use surface water or groundwater under the direct influence of surface water. Recommendations presented in the Stage 2 M-DBP Agreement in Principle and a subsequent November 2001 draft proposed rule include an initial period of raw water microbial monitoring, with treatment requirements established based on microbial contaminant levels present in the supply. Utilities serving 10,000 or more consumers and practicing "conventional treatment" (coagulation, sedimentation, and filtration) would be required to conduct monthly monitoring of the raw water supply for *Cryptosporidium* (using EPA Method 1622/23 with minimum 10L samples), *E. coli*, and turbidity over a 24-month period. Specific regulatory compliance requirements would then be established based on the following:

- If monthly samples are collected, classification is to be based on the highest 12-month running annual average.

- If the system conducts monitoring twice per month, classification is to be based on a 2-year mean value of all monitoring data. This increased monitoring must be conducted at evenly distributed time intervals over the 2-year period.

Systems serving 10,000 or more consumers must complete this monitoring and submit a report summarizing the monitoring results to their State/Primacy Agency within two and one half years of promulgation of this regulation. Additional treatment requirements under the LT2ESWTR, based on average raw water *Cryptosporidium* oocyst concentrations, are summarized in Table 5-4.

5. REGULATORY CONSIDERATIONS

Table 5-4 *Cryptosporidium* Treatment Requirements under LT2ESWTR	
Raw Water *Cryptosporidium* Concentration, oocysts per Liter[a]	**Additional Treatment Required for Conventional Treatment Systems in Full Compliance with IESWTR**
Cryptosporidium < 0.075/L	No action required
0.075/L ≤ *Cryptosporidium* <1.0/L	1-log treatment[b]
1.0/L ≤ *Cryptosporidium* <3.0/L	2-log treatment[c]
Cryptosporidium ≥ 3.0/L	2.5-log treatment[c]

a. Based on maximum value for 12-month running annual average, or 2-year mean if twice-monthly monitoring is conducted.

b. Systems may use any combination of technologies to achieve 1-log credit.

c. Systems must achieve at least 1.0-log of total treatment requirement using ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or in-bank filtration.

Under the recommendations presented in the Agreement in Principle, systems would chose technologies to comply with additional treatment requirements from a "toolbox" of options, including improved watershed control, improved treatment system and/or disinfection performance, and additional treatment barriers. Specific "tools" identified, and associated log treatment credits, as presented in the November 2001 pre-proposal draft rule, are summarized in Table 5-5. It is emphasized that EPA has requested comment on the proposed log credits presented in Table 5-5, and may modify assigned credits in the final rule based on comments received.

5. REGULATORY CONSIDERATIONS

Table 5-5
Microbial Toolbox Options, Log Credits, and Design/Implementation Criteria

Toolbox Option	Proposed *Cryptosporidium* Log Credit
Watershed Control Program	0.5-log credit for State-approved program comprising EPA specified elements; Potential for additional credit based on *Cryptosporidium* reduction demonstrated through monitoring.
Alternative Source/Intake Management	No presumptive credit. Systems may be assigned to a lower bin based on *Cryptosporidium* monitoring at new intake location. Re-binning would occur after system begins using new intake location.
Off-Stream Raw Water Storage[a]	0.5-log credit for reservoir with hydraulic residence time (HRT) of at least 21 days: 1.0-log credit for reservoir with HRT of a least 60 days.
Presedimentation Basin[a]	0.5-log credit with continuous operation and coagulant addition. Max loading rate of 1.6 gpm/ft^2, mean influent turbidity ≥ 10 NTU or max influent turbidity ≥ 100 NTU.
Lime Softening	0.5-log credit for second stage softening with coagulant addition.
Bank Filtration[a]	0.5-log credit for 25 ft. setback; 1.0-log credit for 50 ft. setback.
Lower Finished Water Turbidity	0.5-log credit for combined filter effluent turbidity ≤ 0.15 NTU in 95% of samples each month. 1.0-log credit for individual filter effluent turbidity ≤ 0.15 NTU in 95% of samples each month.
Slow Sand Filters	2.5-log credit as add-on technology.
Second Stage Filtration	0.5-log credit for second separate filtration stage in treatment process.
Membranes (MF, UF, NF, RO)	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing.
Bag Filters	1-log credit with demonstration of at least 2-log removal efficiency in challenge test; State may award greater credit.
Cartridge Filters	2-log credit with demonstration of at least 3-log removal efficiency in challenge test; State may award greater credit.
Chlorine Dioxide	Log credit based on demonstration of compliance with CT table or alternative values approved by State.
Ozone	Log credit based on demonstration of compliance with CT table or alternative values approved by State.
UV	Log credit based on demonstration of compliance with UV dose table or alternative values approved by State.
Demonstration of Performance	1.0-log credit if average spore removal ≥ 4-log based on one year of weekly monitoring.
a. Credit available only if source water *Cryptosporidium* monitoring conducted prior to Option.	

5. REGULATORY CONSIDERATIONS

Four years after completion of initial system classification, EPA will initiate a stakeholder process to review available microbial analytical methods and the classification structures. This process will develop the basis for a second round of national assessment monitoring. Six years after completion of initial system classification, systems will be required to conduct a second round of source water monitoring "equivalent or superior to the initial round from a statistical perspective". This process could result in system reclassification to determine additional treatment requirements for *Cryptosporidium* under the current regulatory structure, or in promulgation of a revised regulation, which reflects recommended changes, developed during the stakeholder process.

Compliance schedules for the LT2ESWTR will be contingent upon (1) the availability of sufficient analytical capacity at approved laboratories to conduct the required *Cryptosporidium* and *E. coli* analyses, and (2) the availability of software for transferring, storing, and evaluating the results of all of the microbial analyses. If either of these two items is determined to be insufficient to support the level of analytical testing required, then monitoring, implementation, and compliance schedules for both the LT2ESWTR and the Stage 2 DBPR will be delayed by an equivalent time period. Comments by EPA during December 2002 suggest that the Agency currently believes that both analytical capacity and software availability will be adequate to allow promulgation of this regulation as currently scheduled.

If the scenario discussed above is promulgated as currently recommended, many utilities practicing conventional treatment may need to begin to think in terms of having a process to provide an additional 1-log to 2.5-log removal/inactivation of *Cryptosporidium* oocysts in operation by October 2010. (October 2012, if significant capital improvements are required, with state regulatory agency approval). Based on current research results, it appears that only ozone and ultraviolet (UV) irradiation are serious contenders for inactivation of *Cryptosporidium* oocysts. The recommended plan suggests that membrane

5. REGULATORY CONSIDERATIONS

filtration processes, such as microfiltration and ultrafiltration, would be an acceptable substitute for inactivation processes.

The Agreement in Principle states that "Based on available information, EPA believes that ultraviolet (UV) disinfection is available and feasible", and that "The availability of UV disinfection is a fundamental premise of this Agreement in Principle". However, it is recognized that additional information is needed with regard to engineering issues and to assist Stage regulatory agencies in approving this technology. Concurrent with publication of the proposed LT2ESWTR, EPA therefore will publish the following:

- Information on UV doses and contact times required to achieve up to 3 logs inactivation of *Giardia* and *Cryptosporidium*, and up to 4 logs inactivation of viruses.

- Minimum standards to determine if UV systems are acceptable for compliance with drinking water requirements, including a Validation Protocol and a description of onsite monitoring requirements to ensure ongoing compliance with required dosage levels.

- A UV Guidance Manual, which is to facilitate design and planning of UV systems and to familiarize State/Primacy Agencies and utilities with design and operational issues.

The November 2001 pre-proposal draft of the LT2ESWTR includes disinfection profiling and benchmarking requirements for *Giardia* cysts and viruses similar to those included in the Interim Enhanced Surface Water Treatment Rule. These requirements would apply only to surface water systems that are also required to monitor source water *Cryptosporidium* concentrations under the LT2ESWTR, or (for small systems) if disinfection by-product concentrations in the distribution system exceed specified levels. Disinfection profiles must be prepared using weekly *Giardia* and virus inactivation data over a one-year period; this data must

be representative of inactivation levels provided through the entire treatment facility, and not just for certain treatment segments. Systems serving more than 10,000 consumers will need to begin collecting data needed to develop disinfection profiles within 24 months of promulgation of the LT2ESWTR. The draft proposed rule does include provisions for utilization of existing ("grandfathered") *Giardia* and virus inactivation data in preparing disinfection profiles, providing that the existing data meets specified requirements.

3. Radon

EPA proposed new regulations for radon during October 1999, and it is anticipated that a final rule will be issued during December 2003. Two alternative compliance approaches were included in the proposed radon rule:

- States can elect to develop programs to address the health risks from radon in indoor air through adoption and implementation of a multimedia mitigation program. Under this approach, individual water systems would be required to reduce radon levels in the treated water to 4,000 pCi/L or lower. EPA will encourage States to adopt this approach, as it is considered the most cost-effective way to achieve the greatest reduction in radon exposure risk.

- If the State elects not to develop a multimedia radon mitigation program, individual water systems will be required to reduce radon levels in their system's treated water to 300 pCi/L, or to develop local multimedia mitigation programs and reduce radon levels in drinking water to 4,000 pCi/L.

Systems with radon levels at or below 300 pCi/L would not be required to treat their water to remove radon. States will likely be granted fairly wide latitude in developing and implementing the multimedia mitigation programs, and it is expected that the programs will differ significantly from state to state. The need

for radon treatment will be based on results of quarterly monitoring. If the state regulatory agency commits to the multimedia mitigation and alternative MCL compliance approach within 90 days of final promulgation of the rule, it will be granted an additional 18 months to achieve compliance. Considerable controversy currently surrounds the regulation of radon in drinking water supplies, and modification of this regulation as currently proposed could significantly alter the requirements contained in the final rule.

4. Ground Water Rule

The Ground Water Rule (GWR) was proposed in May 2000, and is currently scheduled for promulgation during August 2003. Communities that use ground water as a source of drinking water either for their entire supply or a portion of their supply are covered under this regulation. Public water systems that use ground water under the influence of surface water, or that blend ground water with surface water prior to treatment are not affected by this regulation. A key aspect of the GWR is whether shallow ground water supplies are susceptible to microbial contamination. These supplies will be termed “vulnerable”, and disinfection will be required. State-led sanitary surveys will determine if disinfection is necessary. Other aspects of the proposed Ground Water Rule are as follows:

- Sanitary surveys; to be conducted by the State every 3 years.
- Hydrogeologic Sensitivity Assessment; will apply only to those systems that do not provide disinfection/treatment to achieve at least 4-log removal/inactivation.
- Source Water Monitoring; again, will apply only to those systems that do not provide disinfection/treatment to achieve at least 4-log removal/inactivation.

- Corrective Actions; necessary only for systems found to have significant deficiencies or fecal contamination in the source water.

- Compliance Monitoring; required reporting to the State regarding disinfection concentrations.

5. MTBE

EPA's semi-annual rulemaking agenda published in the May 13, 2002 *Federal Register* indicated that the Agency plans to propose a Secondary Maximum Contaminant Level for MTBE, based primarily on taste/odor concerns. However, the Agency's most recent rulemaking agenda published in the December 9, 2002 Federal Register indicates that the schedule for proposal and promulgation of an SMCL for MTBE is uncertain at this time.

D. FUTURE REGULATIONS

1. General

In addition to the pending regulations discussed above, there are several additional regulations that will eventually be promulgated under the current SDWA agenda. These rules will be promulgated under the procedures established by the 1996 Amendments to the SDWA, meaning that EPA will no longer establish an MCL for a contaminant based solely on projected health related issues. The Amendments require the use of sound science, and allow for consideration of other factors such as cost, benefits, and competing risks.

2. Drinking Water Contaminants Candidate List

During March 1998, EPA finalized the first Drinking Water Contaminant Candidate List (CCL), which will be used to set regulatory, research, and occurrence-investigation priorities. This list included 19 chemicals and one

microbial contaminant, which the Agency considered as "high priority" with respect to determination of the need to regulate. Since the March 1998 publication of the CCL, EPA narrowed the list of 20 contaminants to a total of 9; these contaminants are summarized in Table 5-6. During June 2002, the Agency announced its preliminary decision that no regulatory action is needed for these 9 contaminants.

Table 5-6
Contaminants to be Considered for Future Regulation

Acanthamoeba (guidance for contact lens wearers)
Naphthalene
Hexachlorobutadiene
Aldrin
Dieldrin
Metribuzin
Sodium (guidance)
Manganese
Sulfate

3. Total Coliform Rule Revisions/Distribution System Rule

As part of the mandated 6-year regulatory review process, EPA announced during August 2002 that it will decline to revise MCLs for 68 contaminants regulated prior to 1997, but that it is considering revisions to the 1989 Total Coliform Rule. These revisions may be expanded into a Distribution System Rule, and may consider issues such as cross connection control, nitrification, impact of biofilms, and the sanitary condition of storage tanks.

4. Other Rules

Additional rules are likely to be proposed by EPA, but these will primarily address administrative issues such as the reformatting of drinking water amendments, streamlining of public notification requirements, and analytical methods updates. EPA presently plans to defer action on regulation of contaminants such as nickel

and atrazine, and has indicated that it likely will not propose a new regulation for aldicarb until August 2004, with a final regulation expected by August 2005.

E. REGULATORY SCHEDULE

EPA's current regulatory promulgation schedule is presented in Table 5-7. Table 5-7 includes both existing and pending/future SDWA regulations.

Table 5-7
Schedule for Promulgation of SDWA Regulations (as of January 2003)

Regulation	Proposed	Final	Effective
Fluoride	11/1985	04/1986	10/1987
8 VOCs (Phase I)	11/1985	07/1987	01/1989
Surface Water Treatment Rule	11/1987	06/1989	06/1993
Coliform Rule[a]	11/1987	06/1989	12/1990
Lead & Copper Minor Revisions	08/1988 04/1998	06/1991 01/2000	01/1992[b] 01/2001
26 Synthetic Organic Contaminants[c], 7 Inorganic Contaminants (Phase II)	05/1989	01/1991	07/1992
MCLs for barium, pentachlorophenol (Phase II)	01/1991	07/1991	01/1993
Phase V Organics, Inorganics	07/1990	07/1992	01/1994
Information Collection Rule (ICR)	02/1994	05/1996	07/1997
Consumer Confidence Reports Rule (CCR)	02/1998	08/1998	09/1998
Unregulated Contaminants (monitoring)[d]	02/1999	09/1999	01/2001
Radionuclides (Phase III) – except radon Radon	07/1991 11/1999	12/2000 12/2003	12/2003 12/2006[e]
Disinfectants / Disinfection By-Products Stage 1 Stage 2	 07/1994 06/2003	 12/1998 10/2004	 01/2002[f,g] 10/2010[h]
Interim Enhanced SWTR Stage 1 – Long-Term Enhanced SWTR Stage 2 – Long-Term Enhanced SWTR	07/1994 04/2000 06/2003	12/1998 01/2002 10/2004	01/2002[f] 01/2005 10/2010[i]
Filter Backwash Recycling Rule (FBRR)	04/2000	06/2001	06/2004[j]

5. REGULATORY CONSIDERATIONS

Table 5-7 Schedule for Promulgation of SDWA Regulations (as of January 2003)			
Ground Water Rule (GWR)	05/2000	08/2003	08/2006[e]
Arsenic	06/2000	01/2001	01/2006[k]
MCLs for aldicarb, aldicarb sulfoxide, aldicarb sulfone	08/2004	08/2005	08/2008[e]

a. Revisions expected by 2005; revised TCR may become Distribution System Rule.
b. Start date for tap monitoring; systems serving more than 50,000 consumers.
c. MCL, MCLG for atrazine to be reconsidered.
d. Tiered monitoring approach pending availability of analytical methods.
e. Assumes regulation in effect 3 years after final promulgation.
f. For systems serving more than 10,000 consumers.
g. Effective 01/2004 for groundwater and small surface water systems.
h. Phased compliance schedule; 10/2010 is projected deadline for compliance with locational TTHM and HAA5 values of 0.080 mg/L and 0.060 mg/L, respectively.
i. Phased compliance schedule; 10/2010 is projected deadline for compliance with additional *Cryptosporidium* treatment requirements.
j. Deadline for modifying recycle point location, if required. 2-year extension available if capital improvements required.
k. Deadline for compliance with revised arsenic MCL.

F. SUMMARY OF MONROE WTP COMPLIANCE

Treated water from the Monroe WTP typically complies with all current state and federal water quality requirements. A separate Monroe WTP regulatory compliance review was prepared and submitted to CBU in September 2001 and again in December 2002. The following is a summary of the Monroe WTP compliance:

- CBU currently complies with the requirement that the turbidity of water produced by individual filters be monitored and recorded at 15 minute intervals. New Hach 1720 D turbidimeters were installed on all filters, and were interfaced with the SCADA system prior to the January 1, 2002 deadline for recording individual filter turbidities.

5. REGULATORY CONSIDERATIONS

- In 2002, the Monroe WTP exceeded the 0.3 NTU turbidity requirement in January and March. The January non-compliance was attributed to problems with the SCADA system. A filter-aid polymer feed system is currently under design to assist CBU with meeting the turbidity requirements.

- The average combined chlorine residual at the plant discharge is maintained at approximately 2.0 mg/l. CBU complies with current disinfection CT requirements for both *Giardia* and viruses, and typically maintain conditions that provide inactivation levels in excess of current minimum requirements. Concerns regarding system security following the events of September 11, 2001 resulted in a decision to increase free chlorine across the flocculation/sedimentation basins from 0.2 mg/l to between 0.7 mg/l and 1.0 mg/l. This resulted in increased concentrations of regulated DBPs in the finished water during late 2001 and early/mid 2002. Following additional evaluation of disinfection practices during September 2002, free chlorine residuals across the basins were reduced to levels utilized prior to September 11, 2001.

- TTHM concentration was 0.051 mg/l for the four quarter running average ending December 2002. Therefore, CBU's distribution system complied with the current TTHM MCL of 0.80 mg/l enacted beginning January 2002. It was noted that TTHM levels during the fourth quarter of 2001 and the second quarter of 2002 were significantly higher than for previous monitoring periods. It is likely that the higher free chlorine concentrations maintained across the flocculation/sedimentation basins between fall 2001 and fall 2002 contributed to the increased TTHM concentrations.

- As utilities were not required to initiate HAA5 monitoring for compliance purposes until the first quarter of 2002, CBU had limited data on HAA5 in the Years 1999 and 2000 and none in 2001. It was noted that HAA5 concentrations for the first two quarters of 2002 were considerably higher

than for the previous four quarters for which monitoring data exists and in both cases exceeded the recently enacted MCL of 0.06 mg/L. As discussed above, while additional evaluation would be required to identify specific causes of the increase, it is considered likely that increases in free chlorine residuals across the flocculation/ sedimentation basins initiated during the fall of 2001 contributed to these higher HAA5 concentrations.

In summary, with the addition of the filter-aid polymer system and changes to coagulation and disinfection practices, the Monroe WTP should meet all current regulatory requirements.

G. CONSIDERATIONS FOR NEW TREATMENT FACILITIES

CBU staff have expressed the desire to design and construct a new facility that is capable of meeting all current and "anticipated future" water quality and treatment requirements. This position is based on the staff's desire to avoid the need for costly modifications of the new treatment facilities soon after startup, in order to maintain compliance with evolving SDWA regulations. In addition, CBU staff has indicated the desire to construct a new facility that can be easily automated.

Review of pending and anticipated future regulatory requirements suggests that there are several water quality/treatment-related parameters that will likely need to be addressed in the design of any new treatment facilities utilizing either the existing Lake Monroe supply or a new surface water or groundwater supply.

For water system expansion scenarios utilizing surface water sources, provisions for the following will likely need to be included:

- Capability to consistently achieve finished water turbidities of 0.1 NTU or lower in order to minimize the potential for passage of microbial pathogens through the treatment process.

5. REGULATORY CONSIDERATIONS

- Ability to maintain TTHM and HAA5 concentrations at less than 0.080 mg/L and 0.060 mg/L, respectively, throughout the entire CBU distribution system.

- Incorporation of a process to inactivate *Cryptosporidium* oocysts, if required under the impending Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). This would likely involve primary disinfection utilizing ultraviolet light irradiation, or the use of membrane technology to remove oocysts if the LT2ESWTR is promulgated as currently drafted.

CBU has expressed interest in membrane technology to meet future turbidity and possible *Cryptosporidium* removal requirements, and to provide their customers high quality drinking water. CBU, with the assistance of B&V, completed a membrane filtration pilot study in Year 2002. The pilot study indicated good results using membrane filtration with Lake Monroe as a water source. The pilot study indicated that with membranes, CBU could consistently achieve finished water turbidities of less than 0.1 NTU. Therefore, membrane technology has been assumed for expansion of the existing Monroe WTP or a new WTP using a surface water supply. In addition, if a new WTP is constructed with membrane filtration, CBU would like to include membranes at the existing Monroe WTP as well. Therefore, alternatives that involve a new WTP will also include retrofitting the existing Monroe WTP with membranes.

For expansion scenarios utilizing groundwater sources, compliance with regulatory requirements would generally be more easily achieved than for surface water supplies. However, compatibility issues would need to be carefully evaluated in order to avoid conditions where intermixing of existing surface water supplies and new ground water supplies could lead to water quality problems within CBU's distribution system. Generally this would involve adjustment of finished water pH and alkalinity to ensure that precipitation or dissolution of existing deposits does not occur upon mixing of the treated ground water and surface water supplies.

5. REGULATORY CONSIDERATIONS

For a new groundwater plant, it is anticipated that the water treatment process will include iron and manganese removal and softening. Iron and manganese would be oxidized and removed by filtration. Filtration could include either conventional granular media filtration or microfiltration/ultrafiltration membrane technology. Unless the groundwater source is considered under the influence of surface water and would require *Cryptosporidium* removal or inactivation, conventional filtration would be adequate and more economical than membranes.

It is assumed that a new groundwater source is likely to have a high hardness level; therefore, a new groundwater plant will require softening. A conventional process such as lime softening would be appropriate; however, this type of process requires more operator attention and could not be easily automated. A membrane process such as reverse osmosis could be implemented for softening and could be automated to function with little operator intervention; however, this process would be more costly than conventional softening processes. CBU has expressed interest in softening the water using reverse osmosis as well as having a plant that is automated. Thus, reverse osmosis for softening and either conventional filtration or membrane filtration has been assumed.